

and shall comply in each case. Approved compliance programs shall automate the rotation of the building and reporting of the compliance results to insure it is done correctly and uniformly and to avoid unnecessary documentation.

### 3.7 Overall Envelope Approach

§143(b)

The overall envelope approach offers greater design flexibility. It allows the designer to make trade-offs between many of the building envelope components. For example, if a designer finds it difficult to insulate the walls to a level adequate for meeting the wall component U-factor requirement, then the insulation level in a roof or floor or the performance of a window component could be increased to offset the under-insulated wall. The same holds true for glazing. If a designer wants to put clear, west-facing glass to enhance the display of merchandise in a show window, it would be possible to use lower SHGC glazing on the other orientations to make up for the increased SHGC on the west.

The overall envelope approach has two parts, and both parts must be met: overall heat loss and overall heat gain. The overall heat loss accounts for the insulating qualities of the building and sets a maximum rate of conductive heat transfer through the building envelope. The requirements are more stringent in more extreme climate zones than in mild climate zones. The overall heat gain accounts for the area of windows and skylights and their ability to block solar heat gains, thereby reducing cooling loads on the building. Cool roofs are also accounted for in the overall heat gain calculations. The heat gain requirements are more stringent in warmer climate zones.

A standard design value and a proposed design value are calculated for both the overall heat loss and the overall heat gain. The standard design building complies with the exact requirements of the prescriptive approach. The standard values are compared to the proposed values calculated from the actual envelope design. If the proposed values do not exceed the standard values, then the overall building envelope requirements are met.

While the overall envelope approach increases design flexibility, this comes at the expense of the complexity of the calculations.

#### 3.7.1 Overall Heat Loss

There are two parts to the overall heat loss calculation. The first is to calculate the standard building heat loss; this becomes the standard that must be met. The second is to calculate the proposed building heat loss, which is compared to the standard to show that it does not exceed the standard building heat loss.

There are five steps to calculating the standard building heat loss:

Step 1 - Calculate areas of each type of envelope assembly (walls, windows, roofs, etc.). If glazing exceeds the maximum allowed area, calculate window adjustment factors as directed on part 1 of form ENV-3-C.